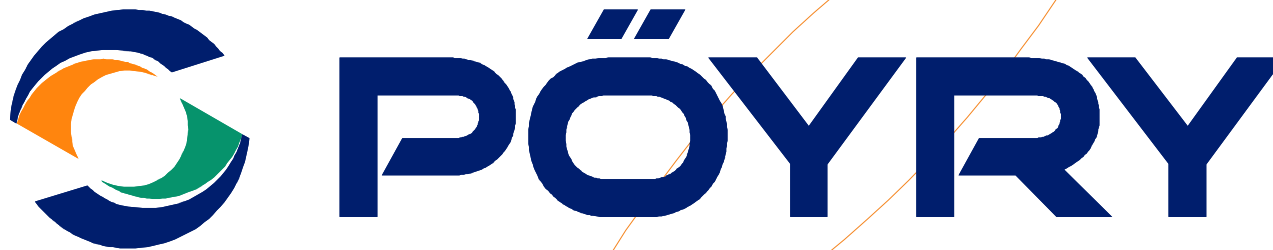


WHAT DO WE MEAN BY 'HARMONISATION'? WHAT SHOULD A GAS QUALITY SPECIFICATION CONTAIN?

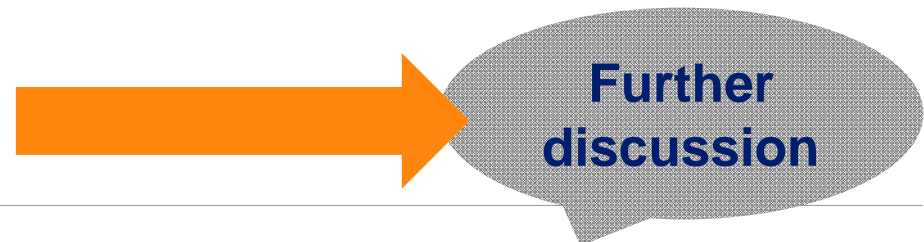
Gas Quality Harmonisation Cost Benefit Analysis
European Commission Workshop – 5th December 2011



Angus Paxton, Principal, Pöyry Management Consulting

AGENDA

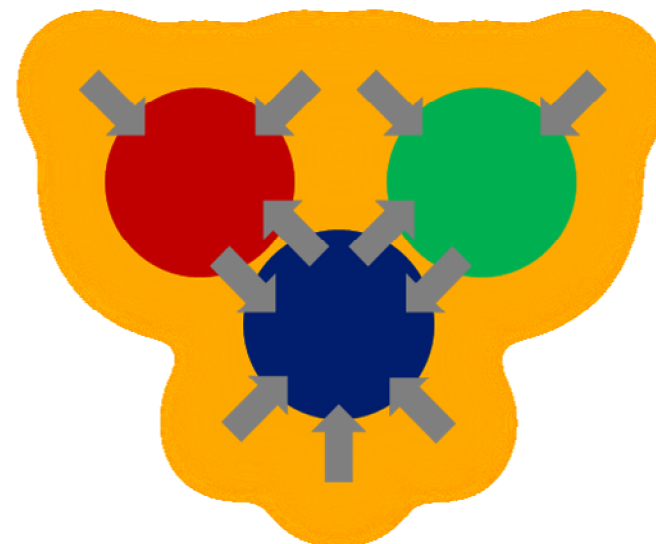
- What do we mean by 'harmonisation'?
 - Existing arrangements
 - Options for achieving 'harmonisation'
 - Other thoughts from further consultation
- What should a gas quality specification contain?



WHAT DO WE MEAN BY HARMONISATION?

This session is intended to explore what harmonisation might mean in terms of network flows, cross-border trade and the obligations and risks on TSOs, shippers and consumers

- This presentation is to explore theoretical models so that we have a **common language** and a framework for analysis
- Assumption of interconnected entry-exit systems
 - **Vertical separation**
 - Transportation independent and functionally separate from shipping/supply/trading
 - **Virtual hubs; fungible product**
 - Gas entered into a zone can be exited anywhere¹ from that zone
 - Entry–hub–exit: no restrictions on virtual hub trades
 - **Non-discrimination**
 - No distinction between transit and transmission



EXISTING ARRANGEMENTS – SPECIFICATIONS & CAPACITY

Existing arrangements are complicated: gas quality specifications are usually considered as a technical detail annexed to capacity arrangements

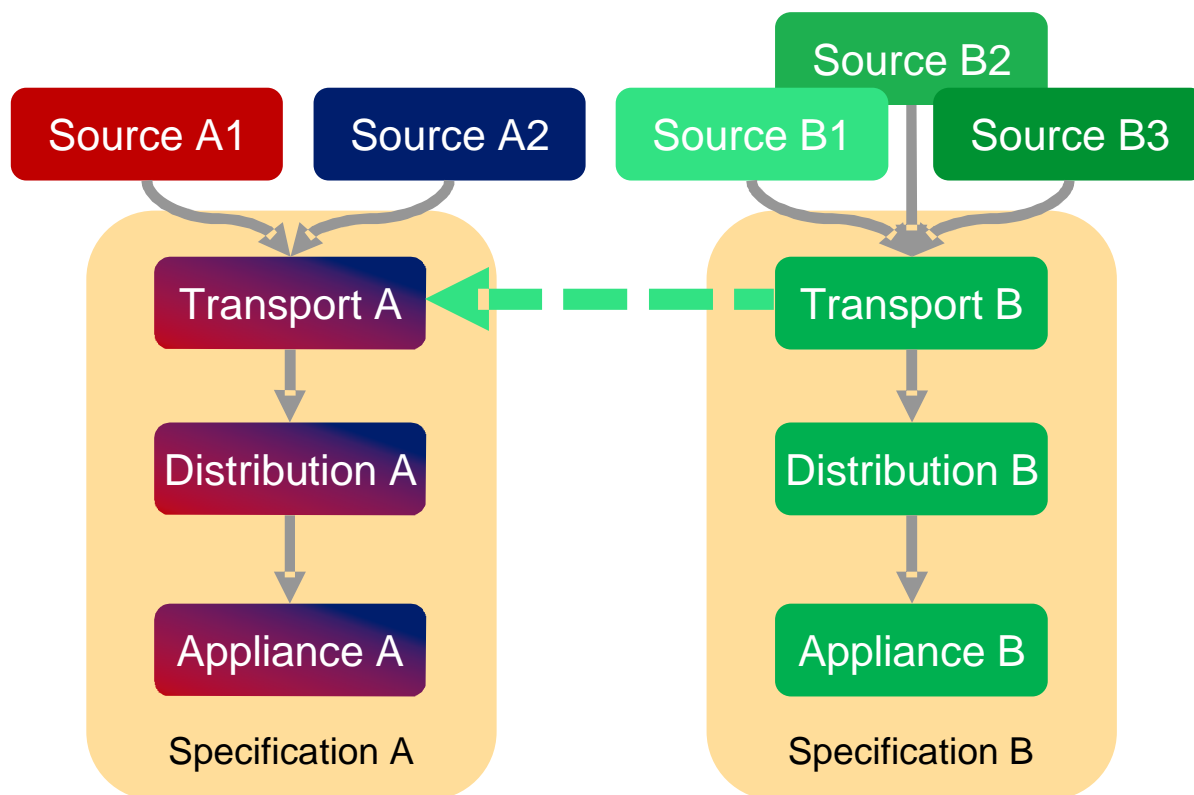
- Jurisdictional specifications
 - Statutory
 - Set by central authority (regulator, standardisation committee, etc.)
 - Transporter set specifications
 - Reflecting downstream systems – transmission/distribution contracts
 - Cognisant of commingling opportunities; possibly commensurate with security obligations
- Additional, transporter-set specifications
 - Limit potential operating costs, possibly part of regulatory settlement
- But... cross border 'capacity' usually ignores the specifications
 - e.g. Interconnector(UK) 'capacity' 25.5bcm
 - Assuming entry gas is compliant with specifications
 - If entry gas • specifications
 - => capacity = 0
- **Are all existing specifications necessary?**



**Further
discussion**

EXISTING ARRANGEMENTS – CROSS-BORDER FLOWS

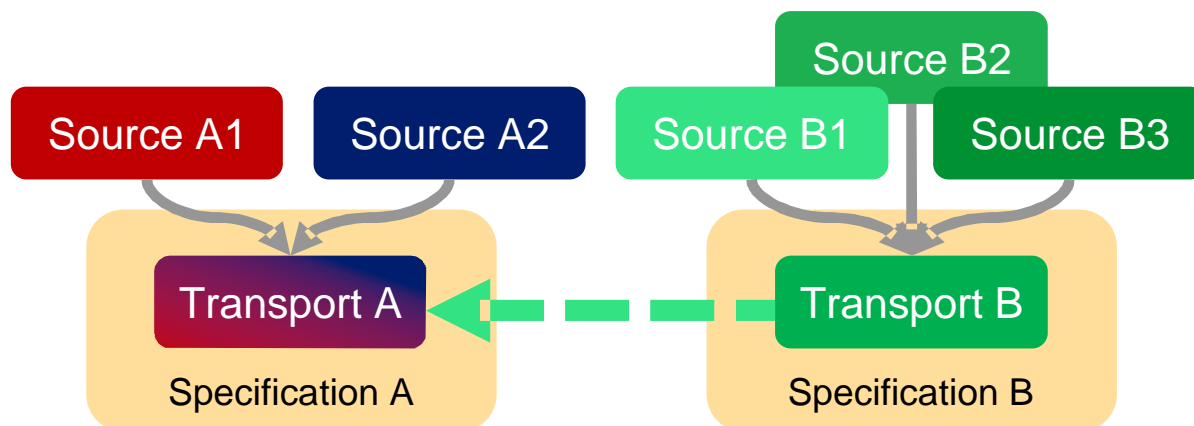
Cross-border trade can occur because actual flows and patterns do not usually present gas quality problems. TSOs ‘blend’¹ or configure network on a reasonable endeavours basis². Appliances are not necessarily (safely) interoperable.



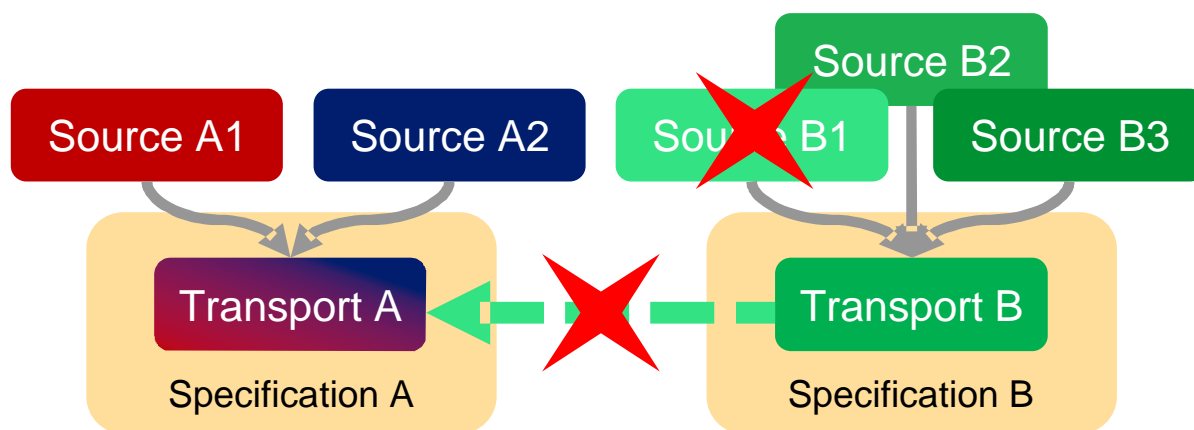
- Potential costs from:
 - **Inefficient supplies**
 - Supply deficit
 - Driving price shocks
 - Possibly limited market liquidity & poor competition?
 - Poor appliance market competition
- ...others?
- **The benefit of harmonisation is the avoidance of these costs**

EXISTING ARRANGEMENTS – RISK

There are inherent risks under existing arrangements but they might not be apparent in normal operation



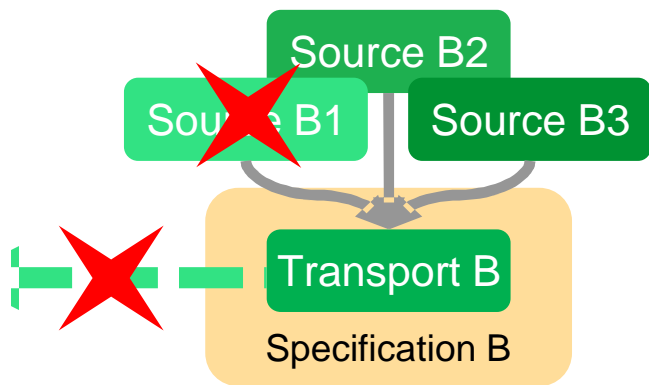
- B1 is compatible with Spec. A.
- Transport B configured to flow B1 to Transport A
- Flows from B to A allowed under normal operation



- Failure of B1 might mean no compatible gas is available for cross-border flow

EXISTING ARRANGEMENTS – WHERE IS THE RISK?

Identifying who is responsible for what at a conceptual level is not simple: it is contractually and legally complex



- Does the unavailability of Source B1 mean that Transporter B has failed to make gas available for offtake?
- Transportation contracts appear, generally, to release transporters from these liabilities
- **Shippers bear the risk – capacity is not ‘fully firm’**
- Entry-exit concepts not uniformly applied
- Existing TSO ‘conversion’ practices: what/where/how?
- TSOs accept some off-specification gas
 - Formally, e.g. UK GSMR exemptions for some entry gas
 - Informally? e.g. temporary deviation
- Disparate cross-border specifications might indicate incompatibility, but incompatible flows impossible
 - **Are some exit specifications too wide?**
- Gas quality issues appear to be normally very well managed by TSOs
 - **Are shippers aware that they are at risk?**

EXISTING ARRANGEMENTS – WHAT ARE THE SPECIFICATIONS?

In practice, some gas quality specification issues are managed by TSOs

- The ***de jure*** ('in practice') specifications might not be applied in many circumstances
- TSOs sometimes accept gas that does not comply with the written specification, presumably subject to various considerations (a ***de facto*** specification)
- The initial CBA assumed the ***de jure*** specifications for the processing option
- The ***de facto*** specifications might present a lower cost – they also perhaps provide lower benefits
- What are the *de facto* specifications?



Further
discussion

HARMONISATION – WHAT ARE THE OPTIONS?

The initial CBA considered two options – full physical harmonisation to a common specification (EASEE-gas), and mandatory processing at cross-border points. There are other options possibly worth considering.

The following slides will outline:

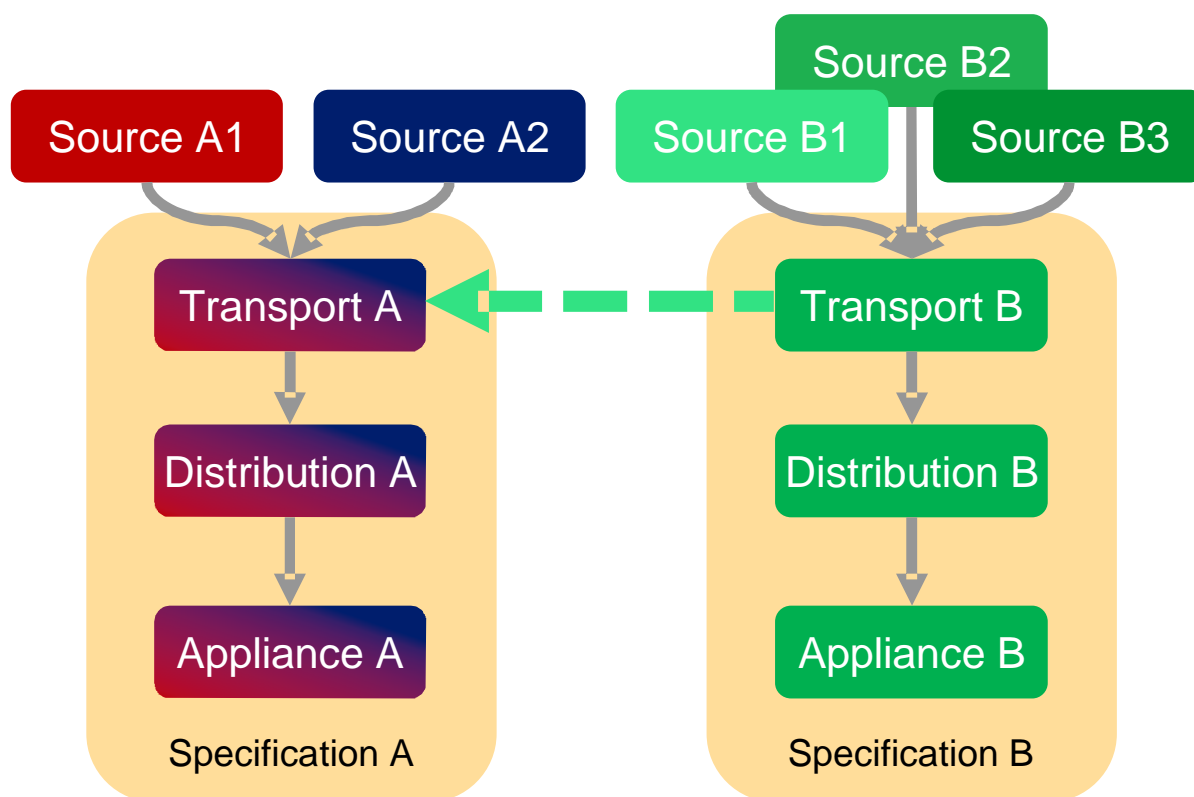
1. Full physical harmonisation
2. Physical harmonisation of wholesale markets to existing specifications (mandatory processing)
 - Upstream and downstream options
3. Fully commercial harmonisation of wholesale markets
4. Harmonisation of transmission networks
5. Possible hybrid approach
6. Regional efficiencies – gas quality zones
 - “Fortress EU”
 - Slow progression



**Further
discussion**

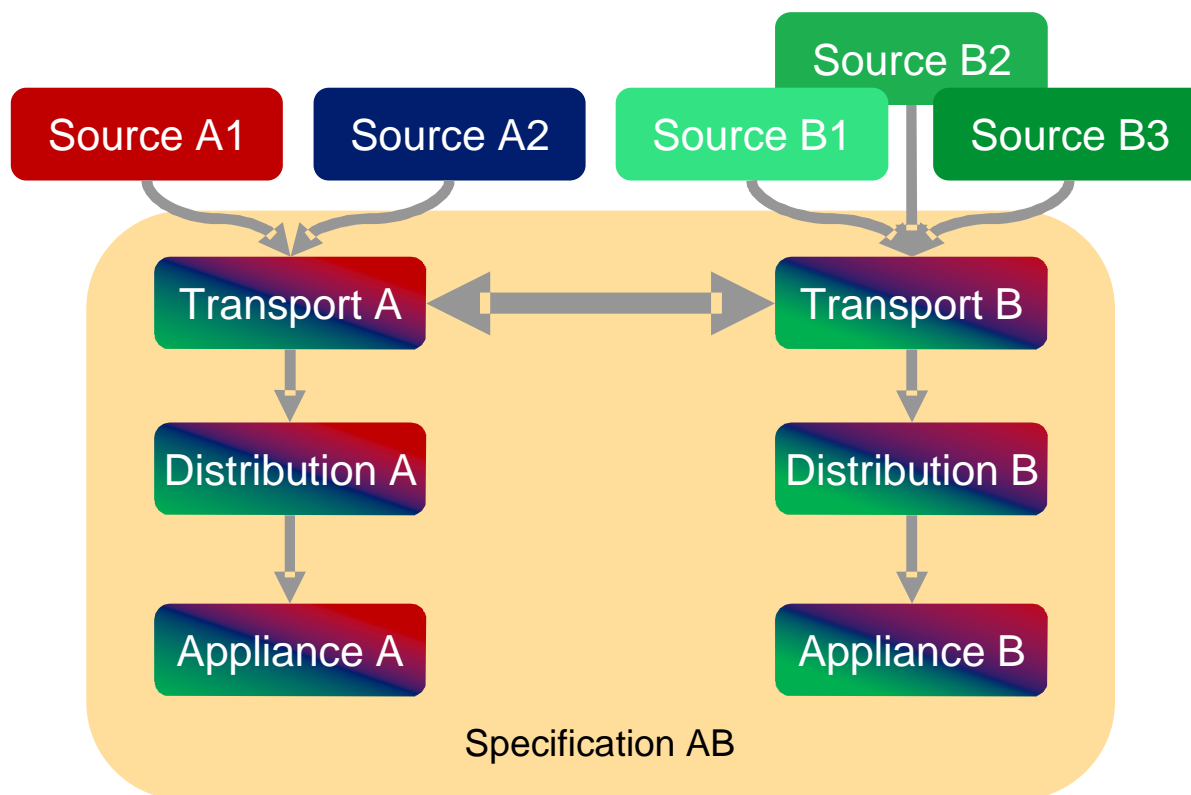
RECAP – EXISTING ARRANGEMENTS

Cross-border trade can occur because actual flows and patterns do not usually present gas quality problems. TSOs 'blend' or configure network on a reasonable endeavours basis.



1 – FULL PHYSICAL HARMONISATION

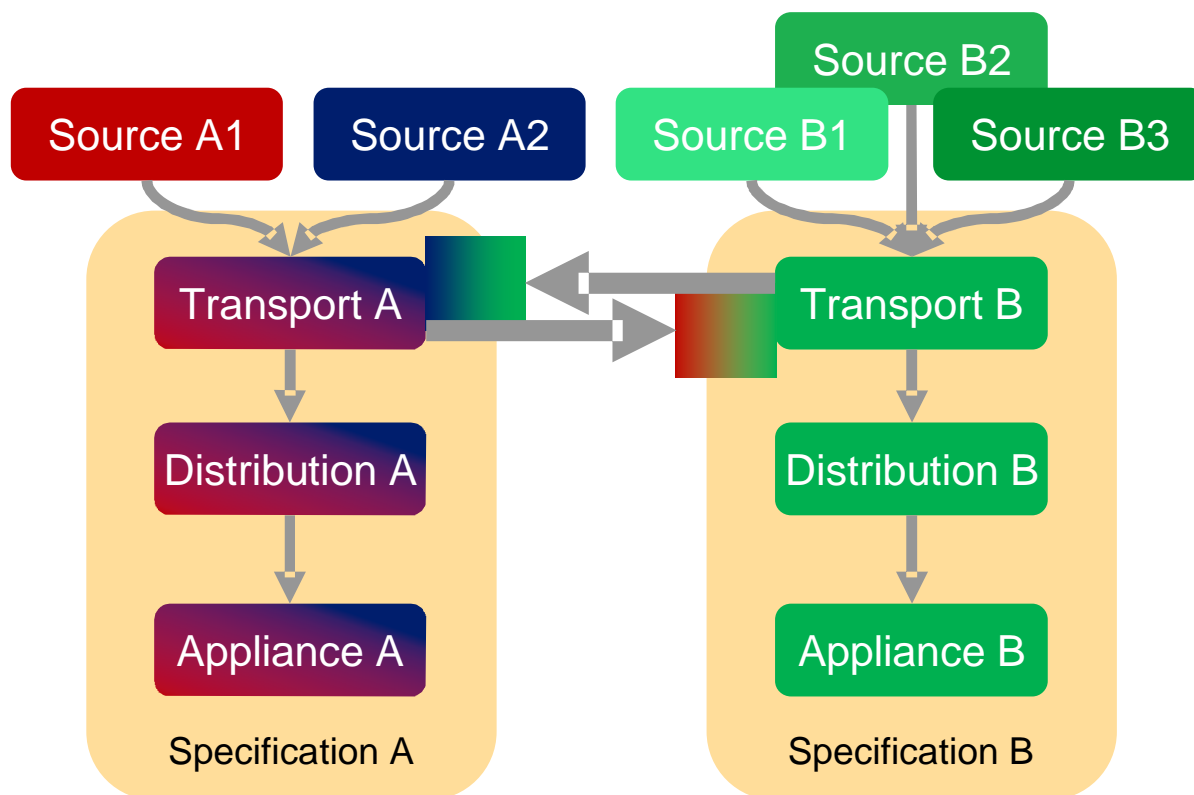
All gasses within the single specification are fully interoperable, and allowed to flow throughout the network, all appliances can operate throughout the range of the specification. TSOs and Shippers operate 'risk free', all cross-border capacity is fully firm.



- Costs of implementation
 - All appliances
 - Replacement
 - Retrofit
 - Retest & retune
 - Time horizon
- AB will be a wider specification than A or B
 - Costs of reduced efficiency

2_A – HARMONISATION OF MARKET – UPSTREAM SPECIFICATION

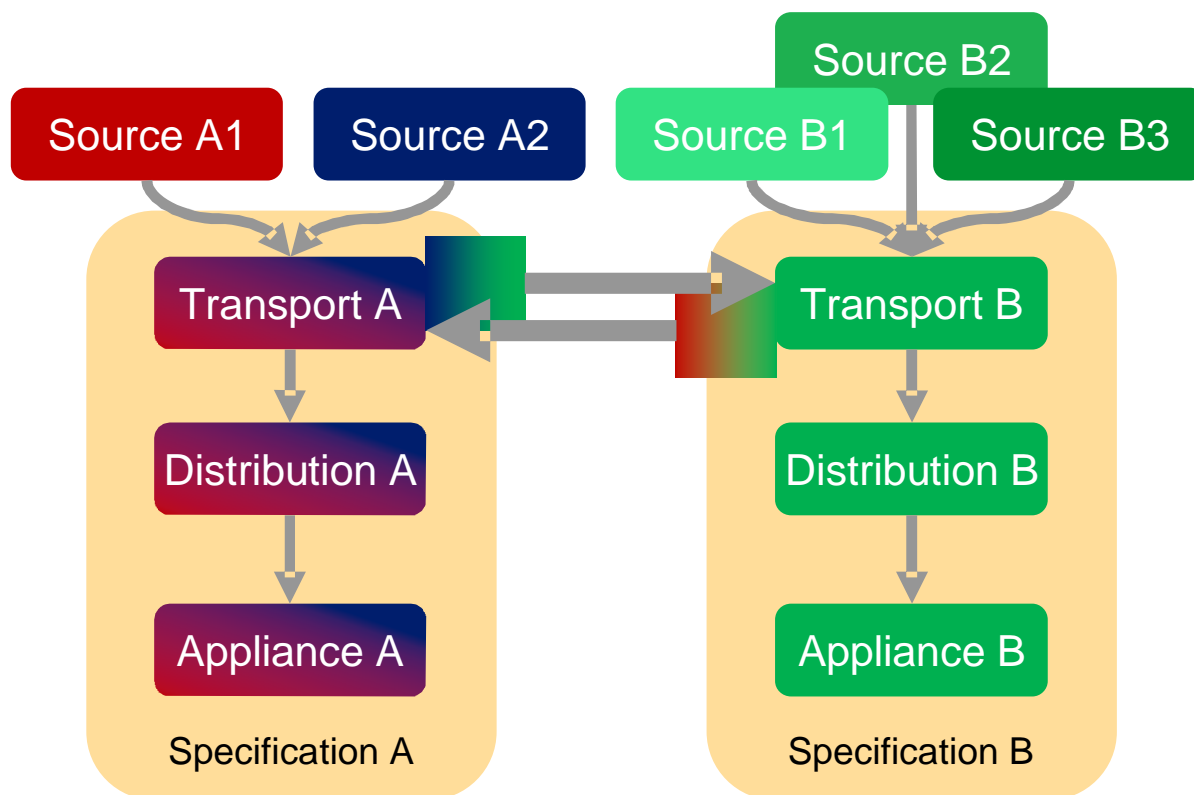
Obligation placed on TSOs to receive any gas that is compliant with the existing upstream specification. Shippers are risk free, all cross-border capacity is fully firm. TSOs held risk free – fully compensated for full investment to meet disparate specifications.



- Costs of implementation
 - Processing equipment
 - Derichment
 - Enrichment
 - Other processing
 - Capex & opex costs
 - Low load factor

2_B – HARMONISATION OF MARKET – DOWNSTREAM SPECIFICATION

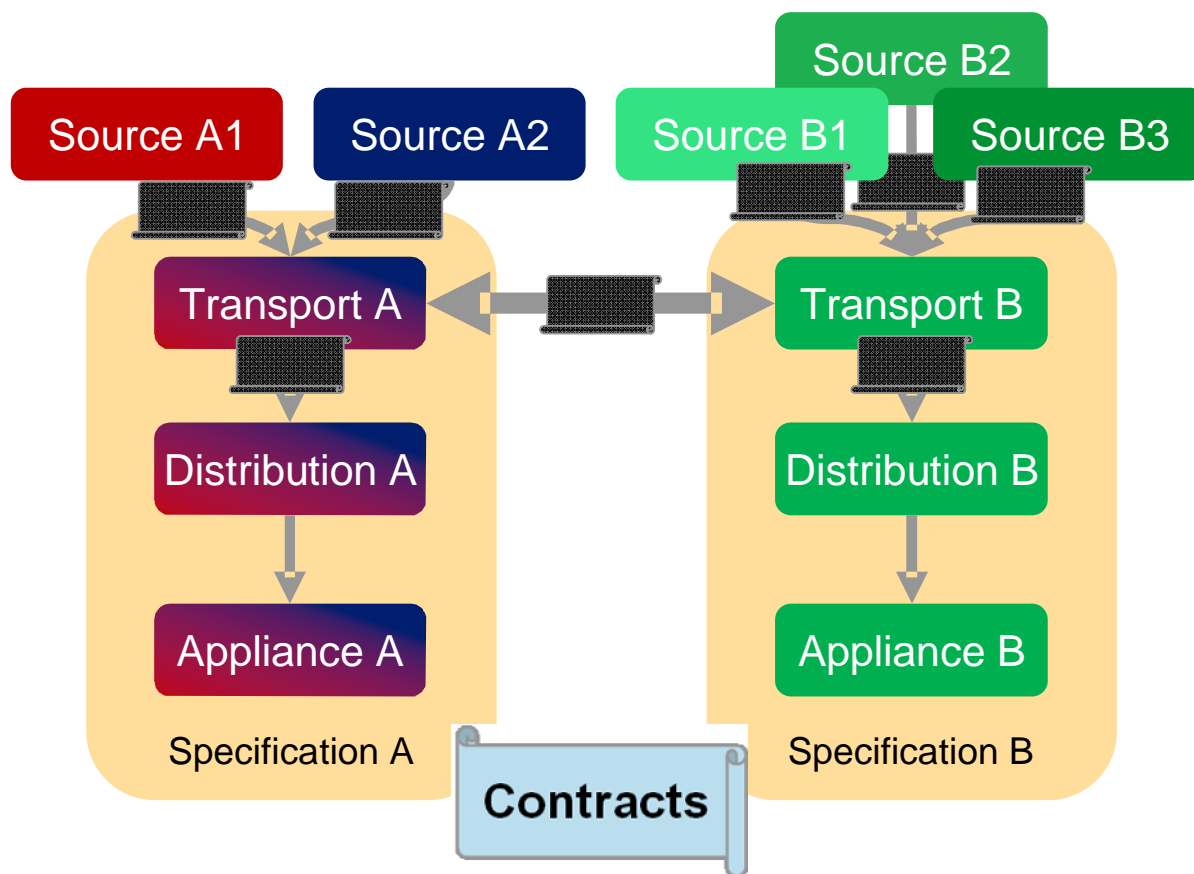
Obligation placed on TSOs to only flow gas out that is compliant with the existing downstream specification. Shippers are risk free, all cross-border capacity is fully firm. TSOs held risk free – fully compensated for full investment to meet disparate specifications.



- Costs of implementation
 - Processing equipment
 - Derichment
 - Enrichment
 - Other processing
 - Capex & opex costs
 - Low load factor

3 – FULLY COMMERCIAL MARKET HARMONISATION

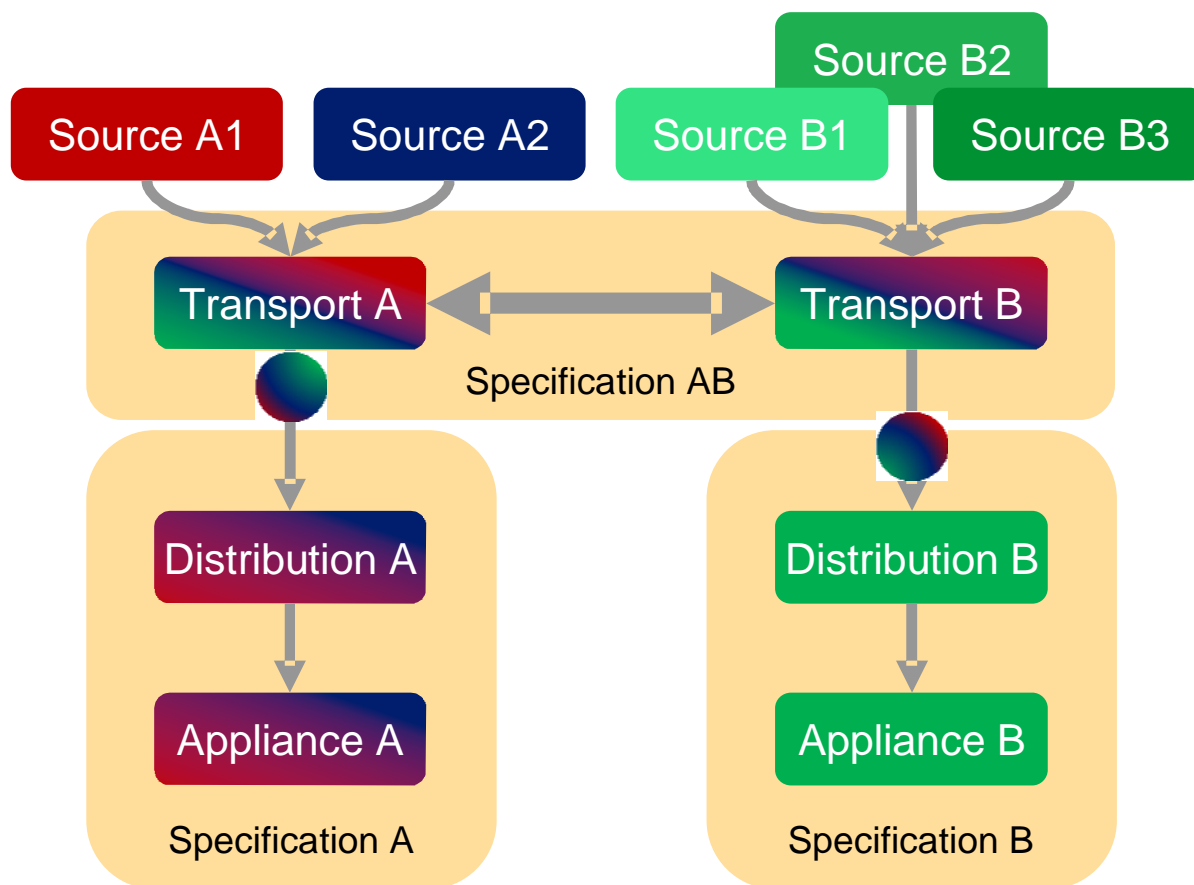
Obligation placed on TSOs to allow any nominations. Impossible combinations of nominations/flow are managed through commercial tools. Shippers are risk free, all cross-border capacity is financially firm¹. TSOs reimbursed, via regulatory oversight, for cost of commercial tools.



- Costs of implementation
 - Commercial options
 - Flow management contracts
 - Locational rebalancing
 - Capacity buy-backs
 - Efficient procurement?
 - Cancels benefits?
 - Does it provide security?
 - Are TSOs risk free?
 - Are shippers risk free?
 - Are consumers risk free?

4 – TRANSMISSION HARMONISATION

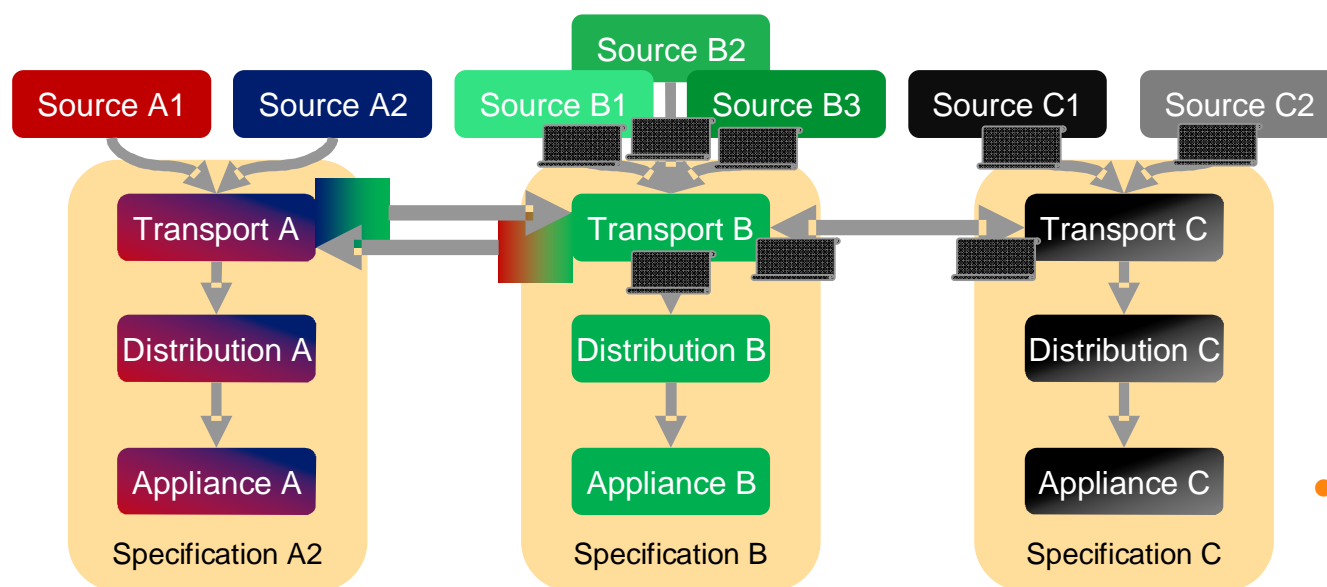
All gasses within a single EU specification are fully fungible, and allowed to flow throughout the transmission network. Existing specifications in distribution networks remain by investing in local processing.



- Costs of implementation
 - Processing equipment
 - Derichment
 - Enrichment
 - Other processing
 - Capex & opex costs
- Potential cost efficiencies
 - Will all offtakes need processing? (Risks?)

5 – HYBRID MARKET HARMONISATION

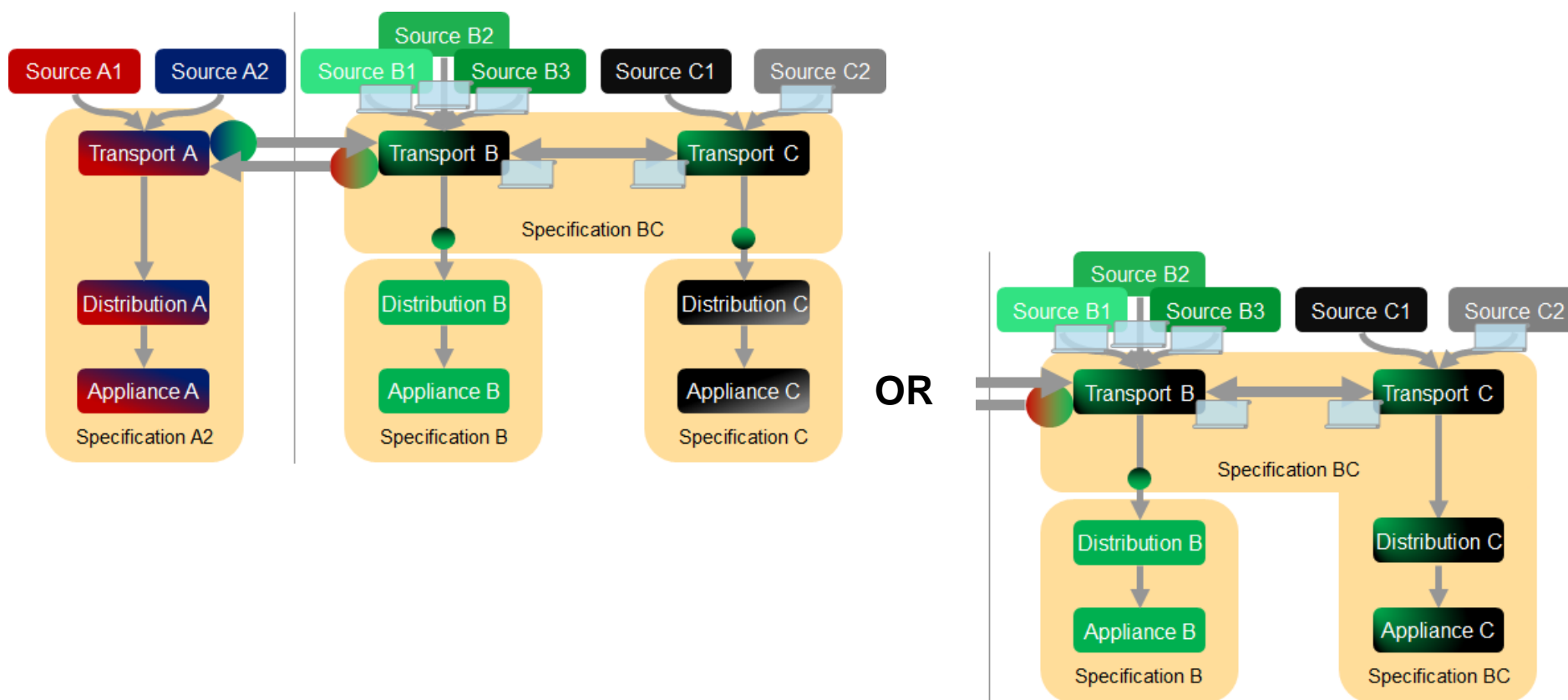
Results in a mix of investment by TSOs in physical processing equipment, commercial contracts and possibly some revised transmission specifications¹. Obligation is placed on TSOs to ensure all exit nominations can be honoured. Shippers risk free.



- Costs of implementation
 - Processing equipment
 - Contracts
- Efficient trade-offs possible
 - Regulatory incentivised

6 – REGIONAL EFFICIENCIES – ZONAL HARMONISATION?

Builds on the hybrid market model by identifying regions where there is commonality in the local gas quality specifications where harmonisation can be achieved at relatively low cost. Further extension could see appliance replacement, too.



“FORTRESS EU”

A suggestion has been put forward that there could be a single specification that applies to the entire EU

- How should local gasses used locally be handled?
 - Exemptions would be needed to avoid unnecessarily shutting gas out
- How narrow or wide should the specification be?
 - Are there appliances capable of receiving the full range of a wide specification?
 - A single narrow specification would require many exemptions
 - In extremis, this concept leads to many different local specifications similar to existing arrangements
- The obligation on individual TSOs would be to accept all gas compliant with the specification
- ...which feels very similar to an obligation to accept all gas compliant with the existing upstream specification...



**Further
discussion**

SLOW PROGRESSION OPTION

Some consultation responses considered that the approach of appliance replacement did not take into consideration natural replacement, and costs would be lower if applied over an extended timeframe

- Note that full benefits would only accrue when appliances have been inspected (replaced, retrofitted, retuned, retested, confirmed as compatible)
- Partial benefits may begin to accrue as each member state (MS) confirms compliance with the new specification
- Until appliance compatibility confirmed in a MS, should the existing specification continue to apply?
- How long should roll-out take?
 - If it is a short time, <5 years, the change to costs will be negligible
 - If it is a long time, >25 years, the benefits are also heavily discounted
 - Whatever the time frame, it will require the new specification to be set at the start of the scheme, which presents additional risks



**Further
discussion**

WHAT SHOULD A GAS QUALITY SPECIFICATION CONTAIN?

Commercially, a gas quality specification forms part of the contract between TSOs, DSOs, shippers, upstream suppliers, and consumers

- There is a vast array of potential constituents of natural gas
- There is a large variety of both different and similar parameters that can be used to describe the physical characteristics of natural gas
- Different local gas quality specifications that currently apply within Europe have evolved nationally or regionally to accommodate the local gas supplies available to the local markets and the gas transportation technologies and practices
- Different players have different requirements and desires
 - Consumers might value particular constituents and/or consistency
 - Particular constituents might change transportation network operational costs
 - Some constituents affect biological processes in some gas storage facilities
- However the primary importance is to ensure the safety of consumers

3 CATEGORIES OF GAS QUALITY SPECIFICATION

Safety

- Wobbe
- Density, or incomplete combustion and sooting
- H₂S & other sulphur compounds
- H₂
- Odour
- ...
- Etc.

Transport & Storage

- O₂
- Dew points
- Dust
- CO₂
- ...
- Etc.

Application

- Methane number
- Propane equivalent number
- N₂
- Rates of change
- ...
- Etc.

§ What should Europe 'harmonise'?

§ What should Europe standardise?



SUMMARY – CONCLUSIONS AND FURTHER WORK

‘Harmonisation’

- ‘Harmonisation’ means different things depending on the context
- ‘Structural options’ for harmonisation
- Continuum between commercial structures with physical status quo and full physical harmonisation
- ‘Commercial’ solutions might be viable, but do not provide security
- Are others obviously too expensive?
 - ‘Full physical’ – work on appliances
 - Market facilitation – risk between TSOs and shippers, and amongst TSOs or shippers

‘Specification’

- Safety is paramount
- Safety is probably more than just ‘burnability’
- Many existing specifications are not safety related
- Specific applications have specific, detailed requirements
 - Hard/expensive to measure/control
 - Not required for the majority of gas consumption

What should the CBA include/exclude?



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FURTHER DISCUSSION – AIDES-MÉMOIRE

- Are all existing gas quality specifications necessary?
- Are some cross-border exit specifications too wide?
- As TSOs manage issues very well, are shippers aware that they are at risk?
- What are the *de facto* specifications?
- Are there any other conceptual solutions for ‘harmonising’ gas quality?
- ‘Fortress EU’
- ‘Slow Progression’
- 3 categories approach
 - Is this a useful construct?
 - Are there further categories/subcategories?
- What specifications should Europe harmonise?